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Its chemical constitution may differ, but the difference of animal species is mainly morphological, and there is no reason why different protoplasm may not occur in similar species, while species differing widely morphologically may be formed of similar protoplasm.—*W. N. L.*

WHITE'S GEOLOGY OF THE SUSQUEHANNA RIVER REGION.[1]—While such a report as this is necessarily filled with details, Professor White has elicited some results (epitomized in the prefatory letter of Professor Lesley) especially bearing on palæontology and glacial geology, which are of general interest. Professor White finds fossiliferous beds high in the Catskill formation, some of the fossils of which appear to be of Chemung type. The discussion of this point is a most interesting one.

The geology of the great terminal moraine, the general course of which is outlined in the prefatory letter of the director of the survey, is discussed. As the ice-sheet, he says, covered the whole country, the high mountain plateaus and the low valleys alike, the moraine is in some places 2000 feet above ocean level, as in the North mountain; in others only 500 feet, as at Berwick. Professor White's observations on the floods of ice-water and the formation of the terrace-plain of part of Columbia county are of much interest.

The limits of the glacial drift in the counties surveyed, are carefully given. "Glacial drift, as a sheet of unstratified sand, gravel and boulders, covers the whole region back of the moraine, and is finally exposed along water-courses. The thickness of this universal mantle of ice-borne trash, brought from the north, is about fifty feet; but where it is banked into the original hollows of the country, filling up ancient river valleys, it is much deeper. * * * Independent observers in other States have assumed fifty feet as about a fair general average thickness for the northern drift over the whole region back of the moraine. If this average be finally accepted, it must set at rest the vexed question of the eroding power of the ice-sheet; for fifty feet of eroded trash carried forward by the ice-sheet can only represent fifty feet (or somewhat less) of mother rock in place. This is an insignficant proportion of the amount of strata (from the coal measures down to the crystalline series) which has been removed from the crust of the earth in the long process of sculpturing the valleys and plains of Pennsylvania and New York, the Great Lake basins and the plain of Canada. Were the average thickness of the drift twice fifty feet, it would be equally true that the erosive power of the ice-sheet has been immensely overrated, and that what erosive power it had was exhausted in merely polishing off and puttying up the topography of the continent." In this paragraph we have a reiteration of Professor Lesley's well-known views, which, though somewhat extreme, are based, doubtless, on the condition of things in Pennsylvania at the former thin edge of the continental glacier. Where, as in the Great Lake region, the ice was undoubtedly thicker and remained a much longer time, the erosion probably went much deeper. We still greatly need a systematic review of all the facts bearing on the thickness of the morainal matter in different localities over the entire glaciated area of North America. In the Rocky Mountain area most certainly, the amount of erosion and of morainal matter are comparatively slight. The observations which are being made by the Pennsylvania survey are, it seems to us, perhaps more detailed and complete than those of other regions. In the New England States, where the ice lasted longer in the White Mountain region than elsewhere, and where the moraines and ice marks are the most recent, we need far more detailed and connected observations than have yet been made.

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[1] *Second Geological Survey of Pennsylvania; Report of Progress* G^7. *The Geology of the Susquehanna River region in the six counties of Wyoming, Lackawanna, Luzerne, Columbia, Montour and Northumberland.* By I. C. WHITE. With a colored geological map in two sheets, and thirty-one page plates in the text. Harrisburg, 1883. 8vo, pp. 464.

To return to our report. From the field work of Professor White, it results that, "Outside, or to the south and west of the moraine, the tops and slopes of the mountains and higher hills of Columbia, Montour and Northumberland counties show no signs of the former presence of ice—no unstratified drift, no ice scratches, no *kames* (formed in ice caverns by subglacial torrents). But the whole country *below* the level of 800′, or 750′ above tide, is more or less covered with a post-glacial stratified deposit of *modified drift*, derived from the moraine and from the glacial drift which covers the country behind it to the east and north." Here the thought arises, if the immense mass of modified drift has been, as it probably has, "derived from the moraine" to the northward, does not Professor Lesley underestimate the original amount of material removed from the rock surface by the glaciers? Was not the depth of erosion originally more than fifty feet?

Then, in rather more florid language than we are accustomed to meet with in State geological reports, the director goes on to say: "These *post-glacial terrace deposits* are supposed, by Professor White, to mark a flooded river age, beginning with that general rise of the thermometer all over the world, which rapidly melted back the ice-sheet and left the continent in its present genial condition. The winter of the ice age was over; the summer burst upon the world; the mountains appeared again; the valleys were reëxcavated. Unimaginable floods poured southward without cessation along all the valleys, and spread out over the lowlands their burdens of moraine stones, rounded and smoothed by the tumultuous waters. When quieter times came, the Susquehanna river and its affluent streams cut down through these post-glacial deposits, as shown by the terraces which now border their banks." Here again the inquiry arises, How could these tumultuous, " unimaginable floods " have poured southward " without cessation " if the ice-sheet was so thin and meager as Mr. Lesley imagines? The hyper-cataclysmal language here used for one series of phenomena, the result of a melting of an ice-sheet which was merely thick enough to "polish off" the topography of a continent, appears somewhat illogical and extreme. Should it not apply to the ice-mass as well? Farther on, to account for "vast heaps of rounded boulders" and other drift deposits on the tops of crests, ridges and hills at elevations of near 1000 feet in the counties above named, the director of the survey remarks: " It seems to me necessary to suppose some sort of submergence of the region beneath sea-level, or, what will amount to the same thing, a general rise of ocean-level to 800′ or 1000′, A. T. This would flood all Southeastern Pennsylvania to within a few hundred feet of the crests of its mountains, and account for most of the terrace deposits in this region."

While Northeastern New England has evidently been submerged some 500 feet, as marine fossils clearly indicate, are there any facts which show that this submergence extended much, if any, below New York city? We have supposed that south of this point the oscillation of the coast line was confined to but a few feet, as witnessed by the position near sea-level of the Quaternary beds of South Carolina.

The continued survey of the surface geology of a region like Pennsylvania, which lies both south and north of the great terminal moraine, will, in the end, aid much in solving such questions as have been brought up in the present able report.

SECOND REPORT OF THE U. S. GEOLOGICAL SURVEY.[1]—Though this report has been issued for some time it has not been noticed in this magazine. It is a bulky royal octavo volume, well printed on good paper, with excellent and abundant illustrations (sixty-one plates and thirty-two wood-cuts); the mechanical execution being much superior to the average Government report. The more notable contents are the reports on the physical geology of the Grand Cañon district by Capt. C. E. Dutton; Contributions to the history of Lake Bonneville, by G. K. Gilbert; abstract of a report on the geology and mining industry of Leadville, by S. F. Emmons; a summary of the geology of the Comstock lode and the Washoe district, by Geo. F. Becker; production of the precious metals in the United States, by Clarence King; a new method of measuring heights by means of the barometer, by G. K. Gilbert.

The splendid report of Captain Dutton on the Grand Cañon district having been published in full, we shall defer our notice of

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[1] *Second Annual Report of the United States Geological Survey to the Secretary of the Interior, 1880–'81.* By J. W. POWELL, director. Washington, 1882. Royal 8vo, pp. 588.